

The Standards Process: Technical Committee X3B5 Digital Magnetic Tape

Sam Cheatham

**Storage Technology Corporation
Vice President
Tape and Library Systems Development
VC Technical Committee X3B5
2270 South 88th Street
MS 0275
Louisville, CO 80028**

Abstract

The presentation will provide the definition of X3B5, where it fits in the national and international standards development process and how it interfaces and influences the world community of standards developers. Detail concerning the focus of the committee, how it operates and what the group sees as the future trends in the area of interchange standards utilizing the multifaceted, ubiquitous magnetic tape. Highlighted in the presentation is:

- The definition of X3B5
- Where it fits in the Information Technology Standards development arena (US).
- How it interfaces with the world community of Standards developers.
- The purview of X3B5.
- How it operates. (TC Style Guide)
- The technologies and their future directions.

The Standards Process; X3B5

In general, a technical committee such as X3B5 is defined by the projects it is authorized to develop. Specifically, Technical Committee X3B5, Digital Magnetic Tape, develops proposed standards for the interchange of data by digital magnetic tape for computer peripheral applications. These standards developments apply to three levels of digital data interchange i.e., Media, unrecorded magnetic media and its associated container for media compatibility; Physical Format, the recorded format for subsystem compatibility; Logical Format, the labels and file structure for system interoperability.

The committee is comprised of 40 voting members and 13 observers. Over the many years of its existence, the membership of X3B5 has changed. The changes that have occurred however, have been gradual, reflecting normal attrition and changes in technology. A basic cadre of committee members has always been in place and it provides the necessary continuity to ensure that the developed proposed standards are consistent and technically sound. Effective leadership in a voluntary, consensus process, in addition to technically astute contributing participants are paramount if any level of success is to be achieved. Fortunately, X3B5 has had and still has both. Evidence of the above is demonstrated by the number of projects worked concurrently (28), and the number of standards developed and maintained (28) by the committee which is under the current chairmanship of Mr. Richard Steinbrenner.

In the United States, X3B5 is one of 43 technical committees developing standards in the information technology arena. The Computer Business Equipment Manufacturers Association (CBEMA) is the Secretariat for X3, the Accredited Standards Committee, Information Processing Systems, which manages the standards developments within its purview ensuring that due process in developing these standards is achieved. When a developed standard meets all the due process criteria specified by the American National Standards Institute (ANSI), it is published as an ANSI Standard.

The global relationships of X3B5 are carried out via ANSI's affiliations with the various national and international standards developers. The international committee of interest to X3B5 is the International Organization for Standardization / International Electrotechnical Commission (ISO/IEC) Joint Technical Committee 1 (JTC 1). ANSI not only holds the Secretariat for ISO/IEC JTC 1, but represents the United States in those JTC 1 Sub Committees that are of interest to the U.S. . ISO/IEC JTC 1/SC11, Flexible Magnetic Media for Digital Data Interchange and ISO/IEC JTC 1/SC15, Labelling and File Structure are the committees to which X3B5 is a Co-Technical Advisory Group.

TAGs are committees accredited by ANSI's Executive Standards Council (ExSC) for participation in ISO technical activities and operate in compliance with the ANSI Criteria for the Development and Coordination of US Positions in the International Standardization Activities of the ISO and IEC. The TAG is the ANSI recognized group that has the primary responsibility for participation in the ISO Technical Committee or Subcommittee work. It is the TAGs job to recruit delegations, supervise their work, and determine ANSI positions on proposed standards.

The functions of the TAG are as follows:

- Recommend registration of ANSI as a "P" or "O" member of an ISO technical committee or subcommittee or recommend a change in ANSI membership status on an ISO technical committee or subcommittee. In this case, "P" membership to SC11 and SC15 was recommended.
- Initiate and approve US proposals for new work items for consideration by an ISO technical committee or subcommittee.

- Initiate and approve US working drafts for submittal to ISO technical committees or subcommittees (and where appropriate, working groups) for consideration as committee drafts.
- Determine the US position on an ISO draft international standard, draft technical report, committee drafts, ISO questionnaires, draft reports of meetings, etc.
- Provide adequate US representation to ISO technical committee or subcommittee meetings, designate heads of delegations and members of delegations, and ensure compliance with the *ANSI Guide for US Delegates to ISO/IEC Meetings*.
- Determine US positions on agenda items of ISO technical committee or subcommittee meetings and advise the US delegation of any flexibility it may have on these positions.
- Nominate US technical experts to serve on ISO working groups.
- Provide assistance to US secretariats of ISO technical committees or subcommittees, upon request, including resolving comments on draft international standards, draft technical reports and committee drafts.
- Identify and establish close liaison with other US technical advisory groups in related fields, or identify ISO or IEC activities that may overlap the TAG's scope.
- Recommend to ANSI the acceptance of secretariats for ISO technical committees or subcommittees. ANSI hold the Secretariat for SC11.
- Recommend that ANSI invite ISO technical committees or subcommittees to meet in the United States.
- Recommend to ANSI US candidates for chair of ISO technical committees or subcommittees and US convenors of ISO working Groups.

X3B5 also interacts with its equivalent technical committees in the European Computer Equipment Manufacturers Association (ECMA), TC17, Magnetic Tapes and Cartridges and TC19, Flexible Disk Cartridges. A number of X3B5 members are also members of the corresponding ECMA committees. This direct involvement provides the conduit to ensure that standards developed in the U.S. are technically equivalent to those developed at ECMA and subsequently at the ISO/IEC JTC 1 Subcommittee. In the U.S., liaison activities with X3 technical committees, X3B6, Instrumentation Tape, X3B8, Flexible Disk Cartridges, X3B11, Optical Digital Data Disks, and X3T9, I/O Interfaces are maintained.

The method of operation employed by the X3 Technical Committees is delineated in X3/Standing Document-2, *Organization, Rules and Procedures of X3*. This document defines the requirements for membership, officers, documentation, voting, etc. that ensure due process. In addition to the official rules and regulations that direct the standards development process within X3B5, the committee has developed a TC Style Guide for use by the various project editors.

The Guide is used to assist in the preparation of draft standards that conform to ANSI's requirements and to X3B5's unique requirements. The guide provides information on format, style, standardized text, approved definitions and conversion of units unique to X3B5's Requirements. Always viewed to be a "living document", it has been updated to:

- Encompass new common aspects brought about by helical-scan technology.
- Be compatible with the ISO/IEC Directives on the Drafting and Presentation of International Standards.
- Be compatible with the new ANSI Style Manual.
- Take into account lessons learned from experience with the ANSI Pre-Edit Process.

Another "tool of the trade" is the Model for Digital Data Interchange by means of removable computer storage media (DDI Model). The purpose of the DDI reference model is to serve as a general planning document which clarifies where specific tasks should be undertaken by standardization committees. It also serves as a conceptual tool which can be applied in building coherent sets of standards for specific digital data interchange applications. The DDI Model is comprised of four levels. Level 1 specifies the interchange requirements for the unrecorded media. Some of the requirements in this area include but are not restricted to the dimensional, mechanical, magnetic and optical properties. Level 2 specifies the interchange requirements for the recorded media. Items such as track locations, data correction techniques, modulation schemes etc., are considered. Level 3 specifies the interchange requirements for the volume identification labels, file directories and file structures of the recorded media. X3B5 concerns itself with these three levels of the model. Level 4 is required in order to accomplish general tasks, such as interchanging ASCII files on a particular medium, or specialized tasks, such as interchanging text on flexible disk cartridges or interchanging images on optical disks.

An example of an implementation of the DDI Model is as follows:

LEVEL 3

LOGICAL FORMAT

X3.27 -1987 *Magnetic Tape Labels and File Structure*

LEVEL 2

PHYSICAL

X3.14 -1983 *Recorded Magnetic Tape, 200 cpi, NRZI*

X3.22 -1990 *Recorded Magnetic Tape, 800 cpi, NRZI*

X3.39 -1992 *Recorded Magnetic Tape, 1600 cpi, PE*

X3.157-1987 *Recorded Magnetic Tape, 3200 cpi, PE*

X3.54 -1992 *Recorded Magnetic Tape, 6260 cpi, GCR*

LEVEL 1

MEDIA

X3.40 -199X *Unrecorded Magnetic Tape, 800 cpi,
1600 cpi, 6250 cpi*

The technologies encompassed by the activities of X3B5 include the following:

LONGITUDINAL RECORDING		HELICAL SCAN RECORDING	
1/2"	Open Reel Tape	4mm	Cartridge
1/2"	Tape Cartridge	8mm	Cartridge
1/4"	Tape Cartridge	12.65mm	Cartridge
.15"	Tape Cassette	19mm	Cartridge

The continuing evolution of the above technologies in the area of volumetric efficiency, elemental capacities and transfer rates as required by the market and the maintenance of present standards constitute a workload that extends into the next century.

The Standards Process

**TECHNICAL COMMITTEE X3B5
DIGITAL MAGNETIC TAPE**

**Sam Cheatham
Storage Technology Corporation
VP Tape & Library Systems Dev.
VC Technical Committee X3B5**

Who / What is X3B5

- **DEFINED BY ASSIGNED PROJECTS**
- **PROJECTS ADDRESS DATA INTERCHANGE**
- **INTERCHANGE MEDIA IS MAGNETIC TAPE**

Sam Cheatham

Storage Technology Corporation

Who / What is X3B5

**TECHNICAL COMMITTEE X3B5 DEVELOPS
PROPOSED STANDARDS FOR THE
INTERCHANGE OF DATA BY DIGITAL
MAGNETIC TAPE FOR COMPUTER
PERIPHERAL APPLICATIONS**

Sam Cheatham

Storage Technology Corporation

Who / What is X3B5

- OPERATING MORE THAN 25 YEARS**
- RESPONSIBLE FOR 56 PROJECTS**

28 UNDER DEVELOPMENT

18 IN MAINTENANCE MODE

5 UNDER REAFFIRMATION

3 UNDER REVISION

1 LIAISON PROJECT

1 TECHNICAL REPORT

Sam Cheatham

Storage Technology Corporation

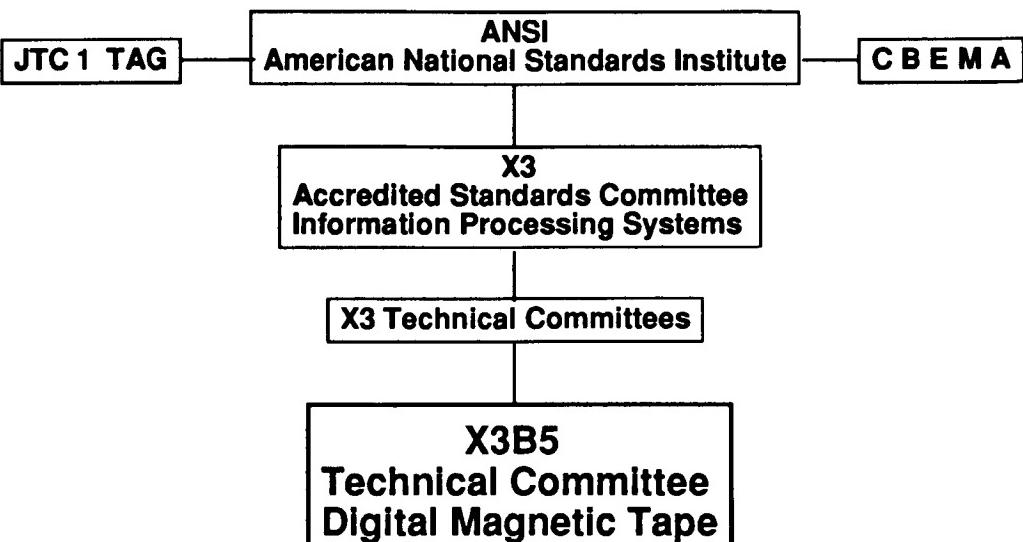
Who / What is X3B5

- 40 VOTING MEMBERS**
- 13 OBSERVERS**
- 150 PERSON MAILING LIST**

Sam Cheatham

Storage Technology Corporation

U.S. ORGANIZATION



Sam Cheatham

Storage Technology Corporation

U.S. ORGANIZATION

X3 Technical Committees

X3A1 Optical Character Recognition

X3B5 Digital Magnetic Tape

X3B6 Instrumentation Tape

X3B7 Magnetic Disks

X3B8 Flexible Disk Cartridges

X3B9 Paper / Forme Layout

X3B10 Credit / Identification Cards

X3B11 Optical Digital Data Disks

X3H2 Database

X3H3 Computer Graphics

X3H4 Information Resource & Dictionary

X3H5 Parallel Processing Constructs
for High Level Programming
Languages

X3H6 Case Tool Integration Models

X3J1 PL / 1

X3J2 Basic

X3J3 Fortran

X3J43 COBOL

X3J7 APT

X3J9 PASCAL

X3J10 APL

X3J11 C

X3J12 DIBOL

X3J13 LISP

X3J14 FORTH

X3J15 DATABASES

X3J16 C++

X3J17 PROLOG

X3J18 REXX

X3K5 Vocabulary

X3L2 Codes & Character Sets

X3L3 Audio / Picture Coding

X3L8 Data Representation

X3S3 Data Communications

X3D2 Data Interchange

X3T3 Open Distributed Processing

X3T4 Security Techniques

X3T5 Open System Interconnection

X3T6 Non-Contact Info System Interface

X3T7 Internationalization

X3T8 Fault Isolation

X3T9 I / O Interface

X3V1 Text: Office & Publishing Systems

X3W1 Office Machines

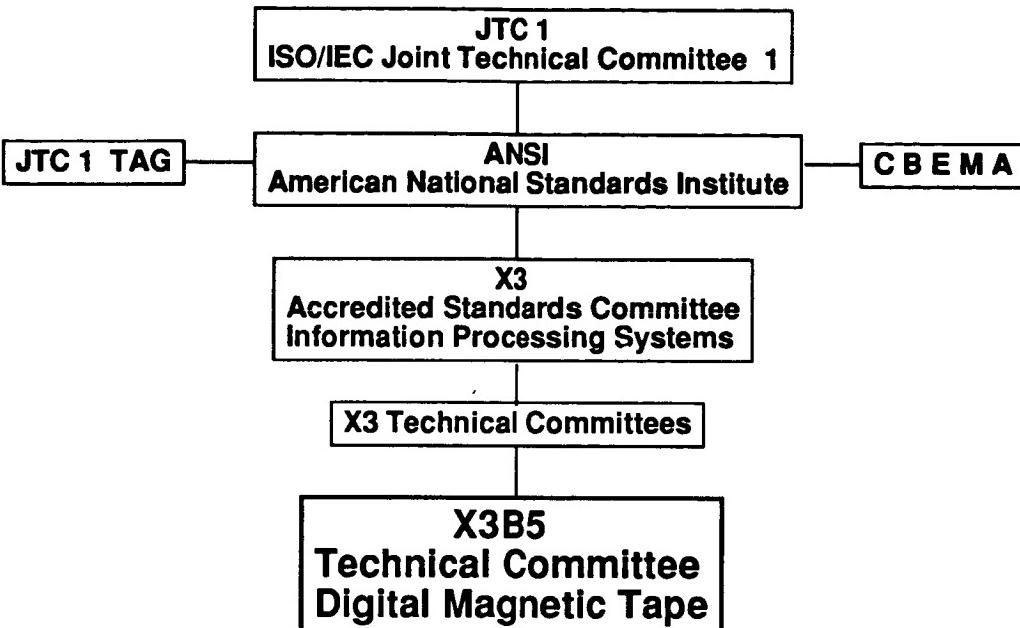
SC21 TAG Information Retrieval &
Management for ISO

SC22 TAG Languages

Sam Cheatham

Storage Technology Corporation

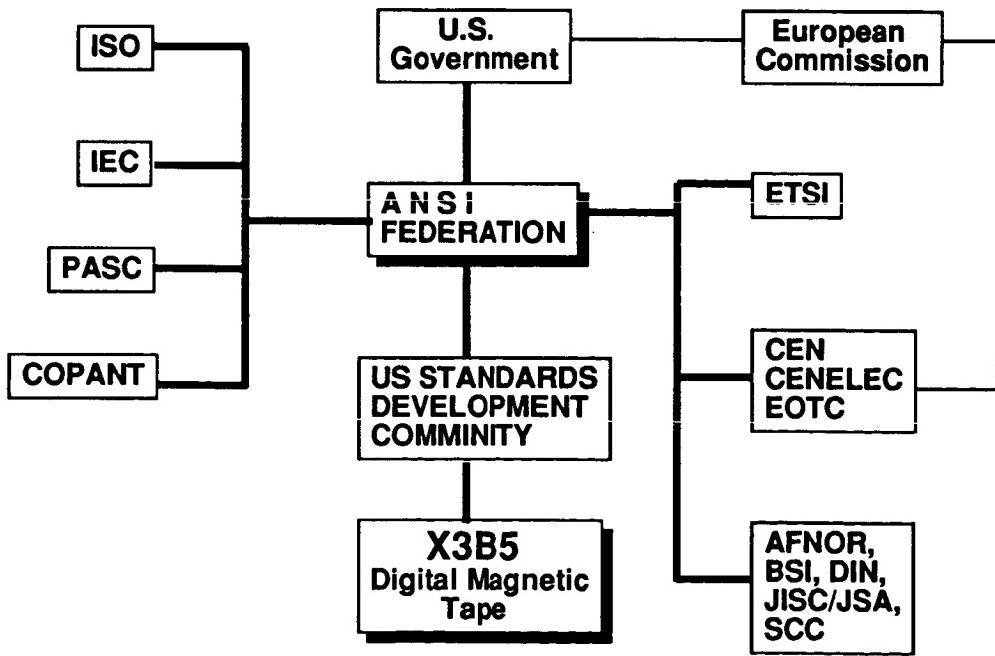
U.S. ORGANIZATION



Sam Cheatham

Storage Technology Corporation

GLOBAL RELATIONSHIPS



Sam Cheatham

Storage Technology Corporation

X3B5 Liaison Activities

ISO/IEC JTC-1

Co U.S. TAG to

SC11, *Flexible Magnetic Media for Digital Data Interchange*
SC15, *Labelling and File Structure*

ECMA

TC17, *Magnetic Tapes and Tape Cartridges*
TC19, *Flexible Disk Cartridges*

X3

X3B6, *Instrumentation Tape*
X3B8, *Flexible Disk Cartridges*
X3B11, *Optical Digital Data Disks*
X3L2, *Codes & Character Sets*
X3T9, *I/O Interfaces*

Sam Cheatham

Storage Technology Corporation

X3B5 How it Operates

Tools of the Trade

- Standing Document 2
- Development Process
- Membership
- Officers
- Agendas
- Document Distribution
- Document Registers
- Meeting Schedules
- Minutes & Action Items
- Voting
- DDI Reference Model
- TC Style Guide

Sam Cheatham

Storage Technology Corporation

X3B5 How it Operates

Procedures: SD-2

"The Object of these procedures is to achieve a concensus of the participants rather than some minimum ratio of approvals versus objections to produce technically sound standards which will be used because of their technical and economic merit and to ensure that due process in developing these standards is achieved."

Sam Cheatham

Storage Technology Corporation

X3B5 How it Operates

The Digital Data Interchange Reference Model

Purpose :

- It serves as a Conceptual Tool in Building a Coherent Set of Standards
- It Serves as a General Planning Document for the Standards Activities

Sam Cheatham

Storage Technology Corporation

X3B5 How it Operates

Level 4:
Applications Requirement

Level 3:
Volume, File & Directory Identification

Level 2:
Interchange Requirements

Level 1:
The Unrecorded Media

Sam Cheatham

Storage Technology Corporation

A DDI Standards Set

**LOGICAL
FORMAT** *X3.27-1987*

(LEVEL 3)

X3.14-1983 **200 CPI**

X3.22-1990 **800 CPI**

PHYSICAL

X3.39-1992 **1600 CPI**

(LEVEL 2)

X3.157-1987 **3200 CPI**

X3.54-1992 **6250 CPI**

MEDIA *X3.40-199X*

(LEVEL 1)

Sam Cheatham

Storage Technology Corporation

X3B5 How it Operates

TC Style Guide

- Assists in the preparation of draft standards

*Conform to ANSI requirements
Conform to X3B5 requirements*

- Provides information on

<i>Format</i>	<i>Style</i>	<i>Units Conversion</i>
<i>Standardized text</i>	<i>Approved definitions</i>	

- A "Living Document" Updated to

*Encompass new common technology aspects
Be compatible with the ISO/IEC Directives
Be compatible with the ANSI Style Manual
Incorporate lessons learned from recent experience*

Sam Cheatham

Storage Technology Corporation

Technologies

Longitudinal Recording

1/2" Open Reel Tape
1/2" Tape Cartridge
1/4" Tape Cartridge
.15" Tape Cassette

Helical Scan Recording

4mm Cartridge
8mm Cartridge
12.65 mm Cartridge
19 mm Cartridge

Sam Cheatham

Storage Technology Corporation

Future Trends (Capacity in M bytes)

Media Technology	Present	Near Term	Future
1/2" Tape Open Reel	180		
1/2" Tape Cartridge	100-320	425-640	1280-2560
1/4" Tape Cartridge	50-1350	2100	10000
.15" Tape Cassette	20-160	410-600	1200
4mm HS Cartridge	2000	4000	8000
8mm HS Cartridge	300-2300	5000	
12.65 mm HS Cartridge		20000	35000 +
19 mm HS Cartridge		10000	

Sam Cheatham

Storage Technology Corporation

Who / What is X3B5

**TECHNICAL COMMITTEE X3B5 DEVELOPS
PROPOSED STANDARDS FOR THE
INTERCHANGE OF DATA BY DIGITAL
MAGNETIC TAPE FOR COMPUTER
PERIPHERAL APPLICATIONS**

Sam Cheatham

Storage Technology Corporation